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The impact of macroeconomic determinants on KSC-100 index

Hayat Khan[1], Itbar Khan[2], Jamil Ahmad Khan[3], Arif Hussain Jandan[4]
[1-3] Department of Management Sciences, National University of Modern Languages, Islamabad, Pakistan
[4] Department of Agriculture Economics, Sindh Agriculture University, Sindh, Pakistan

Abstract
This relationship has been found in many research studies in the world. This paper is to examine the relationship between the KSC-100 index and a set of macroeconomic variables namely interest rate, inflation rate, CPI and foreign exchange rate. For analysis purpose secondary data were used for the period of 1991 to 2009. Multiple Regressions and Pearson's correlation model were applied to the data to find the relationship between KSE-100 index and macroeconomic variables. Model was good fit and was strong relationship between dependent and independent variables. The tests shows that there is 71% variation in the stock prices by variation in independent variables. The results also shows that the impact of independent variables inflation and CPI are positive on ksc-100 index and interest rate and foreign exchange rate are negative.

Keywords: inflation rate, interest rate, exchange rate, CPI, KSE-100 index

Introduction

Different researcher have used macroeconomic variables in the past for finding the impact of those variables on stock prices in different countries. Some of the variables have found grate impact on the stocks prices so there for many refreshers have used different models for finding the impact of macro-economic variables on stock prices on the selected stock exchange. Stock markets have a prominent role in the development of a country economy.

Change in stock exchange index causes bring changes in the macroeconomic factors (Adam *et al*. 2008). Longstanding Research study inspect and give evidences about macroeconomics determinants effect on stock prices. The growing association between macroeconomic variables and the movement of stock prices for the developed countries have well been documented in the literature over the last several years (Fama, 1981; Lee, 1992; Kaneko and Lee, 1995; Mukherjee and Naka, 1995; Booth and Booth, 1997; Mavrides, 2000; Maysami and Koh, 2000; Sadorsky, 2003; Chen, 2003).

The relationship between macroeconomic variables and a developed stock market is well documented in literature. In this study four macroeconomic indicators are used and checking the impact of these four indicators on the KSE-100index. This study in the context of Pakistan to check the relationship between macroeconomic determinants and KSE-100index. This study takes deliberation into four macroeconomic indicators such as inflation, interest rate, CPI and Exchange rate to check the impact of these independent variables on the dependent variable KSE-100 index.

Many researchers have applied many models in the interest to examine the relationship between macroeconomics indicators and stock prices index. The study of (Adam *et al*. 2008) concluded that fluctuations in macroeconomic variables, which leads to the change the structure of stock exchange index. The government polices whether it is fiscal or monitory have a greater impact on the economic activities and stock prices of a country (Abdulland 1997).

Abdullah & Hayworth (1993) [14] examined that interest rate responded negatively on stock returns while stock returns were positively linked with inflation rates and money growth.

Stock markets provide investment opportunity. Stock market of any country accelerates the economic growth. Ups and downs in stock prices is an understandable dilemma of economies among the investors, corporation, policy makers and researcher. Researchers are trying to find out the factors, which effect stock prices. The fundamental macroeconomic variables are inflation, industrial production index, interest rate, gross domestic product, export, exchange rate, money supply, foreign exchange reserves and unemployment has causality with prices index of stock exchange (Booth 1997 and Chan 2003).

Mohamed *et al*. (2007) analyzed the impact of macroeconomic variables on stock returns in Malaysia which established a positive connection between stock prices and inflation.

Stock exchange market is vital actor of financial sector and provides a platform to the users and suppliers of the financial resources for investment purpose in the stocks of companies. Kyereboah-Coleman and Agyire-Tettey (2008) examined the effect of macroeconomic variables on Ghana Stock Exchange. They found that macroeconomic indicators such as lending rates and the inflation rate effect on stock market performance.

Interest rate and foreign exchange rate risks are two important economic factors affecting the common stocks (Hyde, 2007, Vazz *et al.*, 2008)

The stocks are sensitive to interest rates, as the changes in interest rates are inversely related to stocks (Alam, Uddin, 2009).

Literature Review

Most of the study have been conducted to examine the impact of different macroeconomic variables on stock prices. There are mixed result sof the research studies conducted on the relationship on macroenomic variables and stock market returns or stock prices index. For example the study of Khan (2014) examined the relationship between KSE-100 index and macroeconomic variables namely exchange rate, interest rate, inflation rate and GDP for the period of 1992 to 2011 and have applied multiple regression and pearson correlation models for analysis purpose. They have found form the test that there is 80 percent stock variations in the dependent variables explained by the independent variables and have augmented that the model is good fit and the relationship between dependent and independent variables is strong. They have analyzed that GDP, exchange rate and inflation rate have positive relationship with KSE-100 index and interest rate have negative association with KSE-100 index.

Kibria *et al.* (2014) [5] have studies the impact of Macroeconomic Variables on stock market returns in Pakistan. They have selected five macroeconomic variables namely inflation, GDP per Capita, money supply, GDP savings and exchange rate for finding the relationship with KSE-100 index. They have annual data for the period of 1991 to 2013 and for analysis purpose they have found descriptive analysis, correlation, Granger Causality test and Regression analysis. They have analyzed through Granger Causality test that GDP saving and exchange rate does unidirectional Granger Cause Money supply and GDP saving also unidirectional Granger Cause the Karachi stock exchange. There regression analysis shows that Inflation, exchange rate, money supply, GDP per capita and GDP savings has positive effect on KSC-100 index and have suggested to the government to take counteractive actions to control inflation.

Saeed (2012) [13] have examined the impact of macroeconomic variables on stock retunes and have applied multifactor model. For analysis purpose she has selected five macroeconomic variables and have collected data for nine sectors form KSE-100. the five variables of her study are money supply, industrial production, exchange rate, short term interest rate and oil prices and the nice sectors of data are textile , gas and oil, jute, cement, electronics, automobile, chemical, leasing, and ceramics. She has got the closing prices of each firm for the period of ten years from 2000 to 2010. She has used ordinary least square for analysis purpose and have found that there is significant impact of variables on the returns but their contribution is very small for variation in returns. The short term interest rate has significant impact of returns on different sectors and exchange rate and oil prices have significant impact on some specific sectors such as oil and gas, electronics and automobile.

Ilahi *et al* (2015) [3] have anaylyed the impact of have used three variables for analysis purpose to find the impact of inerest and exchange rate on the return of stock of KSC-100 index. They have used secondary date for the period of jan 2007 to dec 2012. They have used regression and found that the independent varibles have low impact on stock returen.

Hunjra *et al* (2014) [15] have studied that macroeconomic variables have significant role in a country economy. Change occur in the macroeconomic variables bring change in the country economy in different ways. When changes happens, the regulatory authority takes necessary steps and bring amendments in the country policies for economy development. They have determined they have determined the impact of macroeconomic variables on stock prices in Pakistan namely interest rate, inflation rate, exchange rate and FDP in their study and have collected monthly data of 11 years for January 2001 to December 2011 and have applied Granger causality and Cointegration tests for data estimation to find macroeconomic variables effect on stock prices. Finally they have concluded in their study that there is no relationship between dependent variables and explanatory variables in the short run and the relationship is strong in the long run.

Devi and Chandramohan (2016) [1] have studied the relatationship between macroeonomic indicatores and Nigeria stock market returns. They have used monthly data for analysis purpose for the period of January 2000 to 2013 march and have used dickey fuller test and unit root test. They have analyzed the relation that's all used macroeconomic variables are integrated and have great influence on Nigerian stock market returns.

Zaheer and Rashid (2014) [6] studied the impact of inflation, interest rate, exchange rate, money supply and industrial production on stock market returns. They have found that there is long term relationship exist between these variables and stock market. They further studied that industrial productions have direct relationship with stock market returns and inflation have negative relation with stock market returns and exchange rate also relative with stock market returns. They have examined that exchange rate have negative relation with stock market returns. They have suggested that long run the Pakistani stock market will be reactive to the macro economic variables.

Zafar (2013) [8] examined that the FDI have positive effect on the performance of the stock market and have found that there is inverse relationship between real interest rate and stock market performance. They further studied that banking sectors have insignificant impact on the stock market performance.

Karaca (2013) [7] have studied the impact of four variables namely exchange rate, gold prices and import export on ISE-100 index and have used the data for the period of January 1996 to October 2011 for analysis purpose. Vector auto regression modelling technique have applied to the selected data. They concluded that weather have a significant correlation with exchange, gold export and import series or not significant impact on the stock exchange index.

Patel (2012) [10] have examined the relationship between macroeconomic variables and Indian stock market indices have found that there is long run equilibrium relationship between these all. They have found that the commodity prices are the very crucial determinants of the stock markets such as gold prices, oil and silver prices.

Nijam *et al.* (2015) [4] have analyzed the relationship between five macro-economic variables namely GDP, Interest rate, inflation rate balance of payment and exchange rate with Colombo stock exchange . They have used data for the period of 1980 to 2012 and have applied ordinary least square for parameters estimation of the regression model. He has examined that there is strong causality between the

macroeconomic factors and stock market performance in the Sri Lanka.

Hussainey *et al* (2009) [12] examined the relationship between macroeconomic indicators and Vietnam stock prices for the period of 2002 to 2008. They have sued vector auto regression model and vector error correction model and found that there is long term relationship between the macroeconomic variables with the Vietnam stock exchange stock prices.

Rahman *et al* (2009) [2, 9, 11] conducted a study in context of Malaysia for finding the monetary policy variables effect on Malaysia stock exchange. They found that there is significant relationship between domestic supply factors and stock market. They have used four macroeconomic variables namely exchange rate, money supply, interest rate and industrial production index and have found that there is these variable have a great impact on stock market in both ways negative and positive.

Research Methodology

This paper is to investigate the effect of Macroeconomic variables on KSE-100 (Karachi Stock Exchange) and to check the relationship among these variables. This study in quantified in natures and secondary data were applied for analysis.

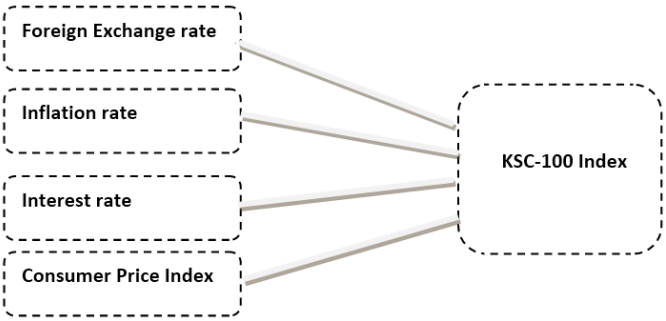
Data Collection

The main objective of the paper is to examine the relationship between independent variables namely Inflation rate, Interest rate, Exchange Rate, consumer price index with the dependent variable KSC 100 index . Yearly data from 1991 to 2009 have been used for these variables. In this paper the secondary data have been used for achieving objectives of the paper. The data for these variables have taken from different sources such is Trading economic website, SBP, KSE and Google etc. for determination of these variables on KSE-100 index.

Description of variables

In this paper there are Inflation rate, Interest rate, Exchange Rate, consumer price index are independent variables and KSC100 index is dependent variable. Here is the effect of independent variables on dependent variable. Inflation tells us the prices over different periods of times due to fall in the buying value of money. Interest rate is the annual cost which comes from using the borrowed amount on principle value. Exchange rate is the rate where two countries' currencies can be exchanged for another country currency. And the consumer price index measures different prices level at different times at market level of goods and services that a consumer purchased.

Theoretical Framework



KSC is the leading stock exchange of Pakistan and stock prices are used as a benchmark by the investors in this stock exchange. KSC have several sectors that are affected by variations in stocks prices. Macroeconomics indicators have affected stock prices such as inflation rate, exchange rate and interest rate. In this model the inflation rate, interest rate, exchange rate and CPI are macroeconomic indicators and have used as an independent variables and KSC100 index is used is a [dependent] variable.

Research Model

In this paper the multiple regression model was used for analysis purpose to find the relationship between dependent and independent variables. The dependent variable is KSC 100 index and independent variables are Exchange rate, inflation rate, interest rate and CPI.

The following is the model

$Y = a+b1(X1) +b2(X2) +b3(X3) +b4(X4) +e$

$\Delta KSE = a+b1\ (INF) +b2\ (\Delta NT) +b3\ (\Delta EXC) +b4\ (\Delta CPI)$

Where;

Where

Y= KSE100 index

x1= Inflation (inf)

x2= Interest Rate (int)

x3= Exchange Rate (exch)

x4= Consumer Price Index (CPI)

KSE-100 index= $\alpha+\beta1\ (inf)+\beta2(int)+\beta3(exch) +\beta4(CPI)$

Result and Findings

Regression Analysis

Method

We have found the relationship between dependent and independent variables from the data used in the analysis shown in the given table.

KSE-100 index= $\alpha+\beta1\ (inf)+\beta2(int)+\beta3(exch) +\beta4(CPI)$

KSE-100 index = (1139.44) + (339.4878) INF1+ (-284.0098) INT2+ (-91.76814) EXCH3 + (.317875) CPI4

Using the mentioned data in the table we have got the result that when there is change comes in the independent variable so it will bring changes in the dependent variables. The independent variables are used in this paper are Exchange rate, inflation rate, interest rate and CPI which bring changes in the dependent variable KSE100 index. From the given data in the table the inflation, and CPI shows positive relationship with dependent variable KSC100 index.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
KSE	19	4093.653	3972.596	1147.943	12870.75
INT	19	4.625789	1.986125	.95	6.69
INF	19	8.973684	4.392524	3.1	20.8
FOREX	19	47.65222	16.11807	22.4228	78.4983
PCI	19	17599.63	13144.74	4003	33973

The given tables represents the summary statistics of data. The first column represents the variables of the study. The second and third column show the observations and means of the variables. Fourth, Fifth and sixth shows the std. dev. Min and maximum value of the entire variables. Mean is 4093, of dependent variable that is KSC which shows where center of data is located and indicates index fluctuation during the year. The largest value of data is 12870.75 and the smallest value is 1147.943, this largest and smallest data show the range of the data. Mean is 4.625789 of independent variable that is INT which show where center of data is located. The largest value of data is 6.69 and the smallest value is .95, this largest and smallest data show the range of the data. Mean is 8.973684 of independent variable that is INF which show where center of data is located. The largest value of data is 20.8 and the smallest value is 3.1, this largest and smallest data show the range of the data. Mean is 47.65222 of independent variable that is Foreign Exchange rate which show where center of data is located. The largest value of data is 78.4983 and the smallest value is 22.4228, this largest and smallest data show the range of the data. Mean is 17599.63 of independent variable that is PCI rate which show where center of data is located. The largest value of data is 33973 and the smallest value is 4003, this largest and smallest data show the range of the data. These numeric values will help to identify the data in appropriate way.

Table 2: Correlation among variables

	Kse	Int	Inf	Forex	Pci
Kse	1				
Int	-0.5978	1			
Inf	0.1736	0.3977	1		
Forex	0.6359	-0.7213	-0.1319	1	
PCI	0.7622	-0.8306	-0.1849	0.9083	1

There is negative association between KSE-2100 and interest rate. If KSE moves up the interest rate goes down. The association between inf and KSE-100 index is positive which indicates that KSE-100 goes up the inflation will also goes up, shown positive association. KSC have positive relationship with forex and CPI which shows that when there is positive fluctuation in KSE-100 index goes up, the CPI and foreign exchange will also move positive side. These results indicates the positive and negative association among these variables.

Table 3: Regression Model

Kse	Coef.	Std. Err.	t	P>t	95% Conf. Interval]	
INT	-284.0098	576.5591	-0.49	0.630	-1520.606	952.5864
INF	339.4878	146.7874	2.31	0.036	24.66005	654.3155
FOREX	-91.76814	84.95926	-1.08	0.298	-273.9876	90.45136
CPI	.317875	.1310806	2.43	0.029	.036735	.5990149
Const	1139.44	4097.366	0.28	0.785	-7648.537	9927.416

F = 8.78, Prob > F = 0.0009, R-squared = 0.7149

The result shows that there is negative relationship between interest rate and KSC100 index. When there is 100% change occurs in the interest rate so it brings -284.0098 percent negative changes in KSC-100 index stock prices. The independent variable inflation have Positive relationship with KSE-100 index, when there is 100% change occur in inflation so it bring -339.4878 percent changes in ksc100 index stock prices. There is negative relationship between foreign exchange rate and KSE-100 index, if there is 100% change occur in foreign exchange rate so it will bring -91.76814 change in stock prices in ksc100 index. Also the relationship between CPI and KSE-100 index is positive and if change occurs in CPI so it will bring .317875 changes in stock prices (KSE-100 index).

We have used the following data analysis to check the significance level of the model to know the significance and insignificance of the variables.

T-Ratio

Through T-ratio individual significance of the regression coefficients are checked.so first we will find the degree of freedom for this test. To find the degree of freedom, the total number of variables will be deducted from total number of observations that are;

In this study the number of observation is 19 and 4 variable are used namely, interest rate, exchange rate, inflation rate and CPI.

Degree of freedom = 19-5 = 14

Find the confident level which is $\alpha = 0.05$

Value of the t-tabulated is (1.753) and in our table the t-calculated value for each independent variable is given. Form the table, the t-calculated value will compare with t-tabulated value which shows the variable is significant or insignificant. T-calculated value for exchange rate from table 2 is (-1.08), interest rate is (-0.49), inflation is (2.31) and CPI is (2.43). We conclude from the data that, inflation rate value and CPI value is greater than then t-calculated value so its mean this variable is statistically significant, while exchange rate, and interest rate are statistically insignificant because there values are less than the t-tabulated value.

F-Ratio

To check that the overall model is significant or not, we used f-test for this purpose. So first we find the degree of free demand confidence interval of f-tabulated from the f-distribution table. We will compare the f-tabulated and f-calculated value if the f-calculated value is greater than the f-tabulated value so its mean the overall model is significant and if the f-calculated value is less than the f-tabulated value then overall model is insignificant. So here f-calculated value is (8.78) and the f–tabulated value is (3.06) that is greater than f-tabulated value which shows the overall model is significant.

Coefficient of Determination (R^2)

From the R^2 it can be find that the model is fit or not the coefficient is determined ranged from 0 to 1. When the value is near to 1 so then the model is good fit. Here in the table the R2 is value is (0.7149), which is near to (1) which shows that there is (71%) variation in the dependent variable that has explained by the independent variable. Which tells us the model is good fit and there is strong relationship between dependent and independent variables. The variation in stocks prices explained up to eighty three percent by the variation in independent variables.

Conclusion

Some of variables in the economy that affect the stock prices of a stock exchange in a country. The KSC is the biggest stock market in Pakistan which capture up to seventy four percent of capital market of Pakistan. Stock exchange plays a vital role in a country economic development. We have used four macroeconomic variable for finding the impact of these variables on KSC stock prices. Data were used for the period of 1991 to 2009. Multiple Regressions and Pearson, s correlation model were applied to the data to find the relationship between KSE100 index and macroeconomic variables. Model was good fit and was strong relationship between dependent and independent variables. The tests shows that there is 71% variation in the stock prices by variation in independent variables.

Moderate positive correlation between inflation and stock prices and it is also statistically significant, that confirmed the result of the (Asperm 1989) research study. GDP growth rate correlation with stock prices of Karachi stock exchange is positive but very weak and also statistically insignificant. Therefore, it does not require too much consideration. From the relationship it was Concluded that independent variables show positive and negative or direct and indirect relationship but not strong enough to consider important.

The finding from the test shows (71%) variations in the dependent variable were explained by the independent variables namely exchange rate, interest rate, inflation rate and CPI. Therefore, the model was good fit and the relationship between dependent and independent variable is strong and variation in stocks is explained by independent variables. The results also suggest that the impact of independent variables are positive on ksc100 index except interest rate. The relationship between interest rate, foreign exchange are negative with stock prices which means that when rate of interest and foreign exchange increases, the stock prices of stock exchange decrease. This confirmed the previous research studies, which wear conducted by different researchers. (Nishat and Shaheen 2007), (Asperm 1989) shows negative correlation between interest rate and stock prices. Analysis among the independent variables suggests no such strong correlation amongst the independent variables which are for Further Research.

Limitations of the study

The analysis is based on the data gathered for the year 1991-2009. Data size is small but due to the lack of time and data availability, we were restricted. Our result is reliable under these limitations. For better and comprehensive results on KSE- 100index, we need large sample size. A cross country study of developing countries with rich data is recommended to further investigate the determinants of Macroeconomic.

Future implications

This study is mainly emphasis on specifically macroeconomic determinants on KSE- 100index in Pakistan. A cross country study of developing countries with rich data is recommended to further investigate the impact of macroeconomic determinants like gold rate, Industrial Production (IP), Human capital (Labor force), infrastructure, domestic investment (DI), foreign direct investment (FDI) and Consumer price index (CPI), oil prices (OP), wholesale price index (WPI), Balance of payment and economics growth on Karachi stock Exchange- 100index in Pakistan. Data can also be taken for larger sample sizes to increases the generalizability of the findings.

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